

UNIVERSITY OF JAFFNA SRI LANKA
BACHELOR OF PHARMACY
SECOND YEAR FIRST SEMESTER EXAMINATION –AUGUST 2016
PHACE 2124 PHARMACEUTICAL CHEMISTRY II

Date: 10.08.2016

Time: 3 hours

ANSWER ALL SIX QUESTIONS

1 1.1 Define the following terms.

1.1.1 Racemate

(05 Marks)

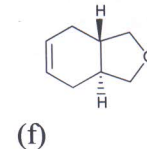
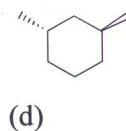
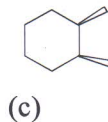
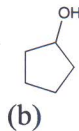
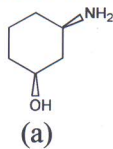
1.1.2 Meso compound

(05 Marks)

1.1.3 Optical activity

(05 Marks)

1.2 State whether each of the given compound is chiral or not?



(25 Marks)

1.3 Give the symmetry elements present in the following molecules.

1.3.1 BCl_3 1.3.2 H_2O 1.3.3 SF_6

(30 Marks)

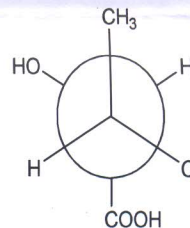
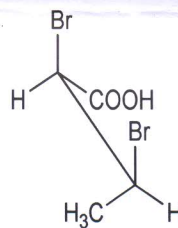
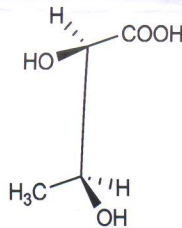
1.4 Draw the Fischer projection formula for the following compounds.

1.4.1

1.4.2

1.4.3

(30 Marks)



2 2.1 Differentiate the transition state and intermediate state.

(10 Marks)

2.2 Classify carbon intermediates and draw their common structure.

(20 Marks)

2.3 Arrange the following species in the order of increasing stability.

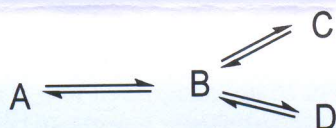
2.3.1 (A) $\text{H}_2\text{C}=\bar{\text{C}}\text{H}$ (B) $\text{HC}\equiv\bar{\text{C}}$ (C) $\text{CH}_3-\bar{\text{C}}\text{H}_2$ (D) $\text{CH}_3\text{CH}_2-\bar{\text{C}}\text{H}_2$ (E) $(\text{CH}_3)_2\text{CH}-\bar{\text{C}}\text{H}_2$

(20 Marks)

- 2.3.2 (A) $(\text{Ph})_3^+\text{C}$
 (B) $(\text{Me})_3^+\text{C}$
 (C) $\text{CH}_2=\text{CH}-^+\text{CH}_2$
 (D) $\text{CH}_2=^+\text{CH}$
 (E) $^+\text{CH}_3$

(20 Marks)

2.4



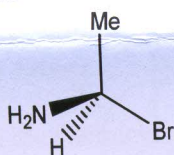
The conversion of A to B is endothermic by 125.5KJ/mol and the conversion of B to C and B to D are exothermic by 146.4KJ/mol and 167.4KJ/mol respectively. The energies of activation (EA) are as follows.

B to A : 25KJ/mol, B to C : 16.8KJ/mol and B to D : 8.4KJ/mol.

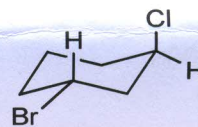
- 2.4.1 Draw a completely labeled energy profile diagram for this reaction. (20 Marks)
 2.4.2 Mention the location of the transition states. (05 Marks)
 2.4.3 Indicate the rate determining step(s) in the scheme. (05 Marks)

- 3 3.1 Specify the configuration as R or S of all the chiral centers in each of the following molecules.

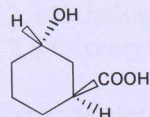
3.1.1



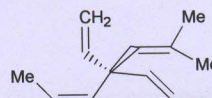
3.1.2



3.1.3



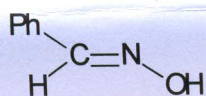
3.1.4



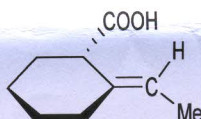
(40 Marks)

- 3.2 Assign configurations to the given unsaturated compounds by means of E/Z convention

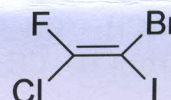
3.2.1



3.2.2



3.2.3



(30 Marks)

3.3 Name the chemicals given below and specify the configuration as **D** or **L** for the following projections.

3.3.1

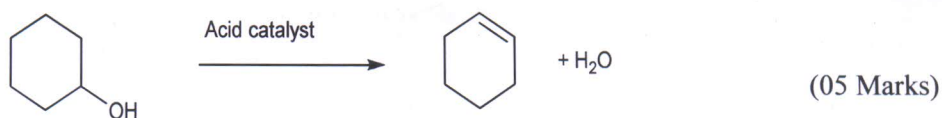
3.3.2

3.3.3

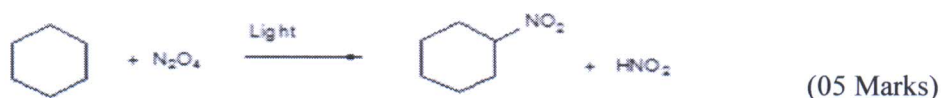
(30 Marks)

4 4.1 Identify the following reactions as addition, elimination, substitution or rearrangement.

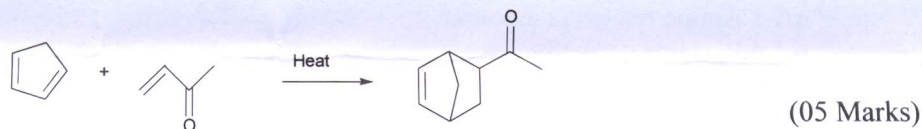
4.1.1



4.1.2



4.1.3



4.2 Explain why the addition of HCl to 3,3-dimethyl 1-butene gives the products 2-chloro 3,3-dimethylbutane and 2-chloro 2,3-dimethylbutane.

(30 Marks)

4.3 List the differences between Elimination 1 (E1) and Elimination 2 (E2) reactions.

(30 Marks)

4.4 Discuss the effects of variables on S_N1 reaction.

(25 Marks)

5 5.1 Explain the relationship of pKa values and acidity.

(10 Marks)

5.2 Arrange the following compounds in decreasing order of their acidity at 25°C in water.

MeNH₂,

Me₃N,

Me₂NH,

C₆H₅NH₂,

p-NO₂-C₆H₄NH₂

(40 Marks)

- 5.3 Classify the following chemical species as aromatic, non-aromatic and anti-aromatic with π -molecular orbital energy level diagrams and give the reasons.

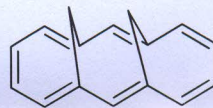
5.3.1



5.3.2

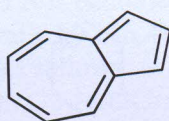


5.3.3



(30 Marks)

- 5.4 Heat of hydrogenation of cyclopentene, cycloheptene and azulene are -27.5, -28.0 and -90.0 kcal/mol respectively. Calculate the approximate value of resonance energy of azulene.



Azulene

(20 Marks)

- 6 6.1 Name an example for each of the following functional group containing pharmaceutical product/drug.
- | | |
|--------------------------------|------------|
| 6.1.1 Cycloalkane derivative | (03 Marks) |
| 6.1.2 Aldehyde derivative | (03 Marks) |
| 6.1.3 Amine related compound | (03 Marks) |
| 6.1.4 Pyridine derivative | (03 Marks) |
| 6.1.5 Aromatic carboxylic acid | (03 Marks) |
- 6.2 Give the chemical structure of the following compounds.
- | | |
|---------------------------|------------|
| 6.2.1 Paracetamol | (10 Marks) |
| 6.2.2 Carbamazepine | (10 Marks) |
| 6.2.3 Halothane | (10 Marks) |
| 6.2.4 Glyceryl trinitrate | (10 Marks) |
- 6.4 Write the steps involved in the synthesis of the following compounds.
- | | |
|------------------------|------------|
| 6.4.1 Tolbutamide | (20 Marks) |
| 6.4.2 Phenytoin sodium | (25 Marks) |